

residual equations coefficients of μ^{iv} equal or superior to those of the original equations. The case is the same as in the question of the Sun's parallax, obtainable by the two methods, the transit of *Venus*, and the perturbations (for instance) of *Mars*: the method of Transits, so important at the epoch of 1760, but limited in its means, must give way ('doit fatalement céder la place') to the method of perturbations, the exactitude of which is continually increasing.

Remarks on Drawings of Jupiter made by Miss Hirst, at Auckland, New Zealand. By S. J. Lambert, Esq.*

On behalf of Miss Hirst, a lady resident in Auckland, New Zealand, who has been engaged in astronomical work for the last sixteen years, I beg to lay before the Royal Astronomical Society some of her notes on the last opposition of *Jupiter*, 1875.

The instrument she used was a Browning's $8\frac{1}{2}$ -inch silvered-glass reflector, and the powers used were Browning achromatic eye-pieces of 144, 208, and 250. The information may be relied upon, as she is both a practical and a careful observer. She has made use of the diagrams used by Lord Rosse, in the *Monthly Notices* for March 1874, where the dark bands are designated by figures, and the bright spaces by letters. With these notes I send you a few of her drawings of *Jupiter*, all of which were made during the observations on the respective dates.

Her diary contains some valuable information on Meteoric Showers, observed in Auckland, which I will send you at some future time.

ZONE I.—The South Polar Zone has exhibited some signs of change during the recent opposition. On February 5, at 4^h 19^m, G.M.T., this zone was seen divided longitudinally, near the pole of the planet; with aperture reduced to 6 inches, a number of small dark spots were visible on the surface of this zone, whose centres were extremely black. During this observation the definition was sharp, and the air steady. This zone has appeared decidedly fainter than last season. On February 20, at 3^h 59^m, G.M.T., a small oval patch of a decided sea-green was visible a little to the east of the pole, which on the following morning was more elongated, and a shade darker in the centre. It remained thus for three days, and has not since been seen.

ZONE *a*.—On many mornings lately, this bright band has been sharply defined. On March 17, at 2^h 36^m, G.M.T., a dark streak, broken in two places, ran along the centre of this zone. Later on, in the morning, it became one continuous line, but of

* These drawings are preserved at the rooms of the Society, where they can be inspected by any Fellow desirous of comparing them with other drawings of *Jupiter*.

an irregular thickness. The same phenomenon was observed on April 7, at 3^h 1^m, G.M.T.

ZONE 2.—This zone has displayed more evidence of change than any other during this season. Sometimes it has presented an entire mottled appearance, as on the morning of March 30. Once it was only seen as a narrow patch on the central meridian, the extremes running into the bright band *b*, and on April 30 it had disappeared altogether, but presented itself again on the following morning. On May 6, it was decidedly darker in colour, while its western extremity curved down into the equatorial zone, having a white cloudy patch on its opposite extremity.

ZONE *b*.—Miss Hirst recorded as follows, with regard to this zone, and I give it in her own words:—"While examining the planet on the morning of April 20, at 1^h 25^m, G.M.T., with power 208, definition being exceedingly good, I thought I detected a dark spot in zone *b*, near the equatorial zone. Thinking this object would improve on reducing the aperture, I put on a 6-inch stop, and used power 144. This spot then came out in great brilliancy, accompanied with three others on the same zone, but smaller than the first, though equally brilliant. I searched for them again many times afterwards, but only saw them once more, when definition was similar to that on the above date."

SOUTH TROPICAL BELT, 3, I.—The bright division in this belt has been noticed to vary very much in width, and at times to be in various parts filled in by the equatorial belt. On some occasions the northern edge of this division has appeared much darker; and on June 4, at 22^h 15^m, G.M.T., this portion of the equatorial zone contained two bright divisions of equal width, each narrower than the division generally visible.

THE EQUATOR, 3, II.—Some very curious phenomena have been observed in this region of the planet. In the central bright band of this zone dark spaces have been observed, generally of an oval form, some of them having dark borders, while others had none. It has also been noticed that the eastern border was always the darker of the two. The first sight of these bright spaces was obtained on the evening of May 1, at 21^h 45^m, G.M.T.

ZONE 3, III.—This zone has been frequently seen with large gaps breaking into *c*, whose southern borders have sometimes been of a dark lead colour. On two occasions a bright spot was observed in the centre of one of these breaks, as on April 5th and 20th.

ZONE *c*.—This zone has certainly appeared much brighter than last year. A curious dark spot was seen near its eastern extremity, on April 7, at 21^h 5^m, G.M.T., but on the following night was missing.

ZONE 4.—A peculiar faintness has characterised this North Temperate Belt on many occasions this year. At times it has appeared very distinctly marked, and more especially on its northern edge. Frequently no division could be detected between it and Zone 5, and on very few occasions has it been seen to advantage.

ZONE *d*, has still been narrowly defined, but not so much so as last year. At times it has appeared much brighter than at others, but generally ill defined.

ZONE 5.—This Polar Zone has not undergone much apparent change since last year. Twice a narrow and very dark belt has been seen running across it; and once, when it was very conspicuous, a small narrow projection was noticed, obliquely uniting 4 with 5. Nothing of this kind was noticed last year in this locality.

The colours of *Jupiter* this year have been more varied than usual, and, on the best nights for definition, have appeared decidedly darker than formerly. Only on two occasions were Mr. Lassell's bright spots detected, and then with a reduced aperture, on the southern belts; and at those times the planet was near opposition, and definition more than ordinarily good.

The transit of the Satellites, with their shadows, have been noticed on many occasions. The most curious phenomena have been indicated by Satellite III. It has frequently appeared as a dark spot when near mid-transit, but on nearing either edge has appeared bright. At times the satellite presented an elongated appearance east and west, while its disk was dark, as in mid-transit, but has been noticed to gradually assume its general outline as it neared the edge of the planet: this was specially noticed on April 9. The same thing has repeatedly been seen with Satellites I. and II., but was less marked than with Satellite III. On one occasion Satellite I. was observed slightly elongated when near mid-transit, but like III. returned gradually to its proper shape while nearing the edge of the disk.

The weather in Auckland for nearly two months before opposition was all that could be desired for observation, but after that date cloudy and unsettled weather set in. Thus the original system of observation was broken, and finally for the season had to be abandoned.

Note on a certain Structure in the Umbrae of Solar Spots.

By Colonel Tennant, R.E.

(Extract from a Letter to Warren De La Rue, Esq.)

"On June 28 I sent you a description of what I had seen of the Sun. I said I was not sure about a certain *structure* in the umbrae of solar spots. Curiously enough, I have found since a communication from Mr. Langley (*Monthly Notices*, Vol. xxxiv., p. 255), which goes over much of the same ground.

"As to the 'rice grains,' it is quite clear that they are not *smooth-surfaced*. Hence one sees light and shade on the surfaces, and the degree is very variable even with slight changes of shade.